

Claims

1. A carbon fiber-reinforced resin composite material produced by curing a composition comprising:
  - (A) an epoxy group-containing vinyl ester resin having, 5 in the molecule, 0.8 to 0.3 equivalent of epoxy group and 0.2 to 0.7 equivalent of an ethylenically unsaturated group,
  - (B) a radical-polymerizable monomer,
  - (C) a curing agent, and
  - (D) a carbon fiber impregnated with 0.5 to 5% by mass 10 of (d) a vinyl ester resin as a sizing agent, obtained by an addition reaction of an epoxy resin and an ethylenically unsaturated carboxylic acid.
2. A carbon fiber-reinforced resin composite material according to Claim 1, wherein the curing agent (C) comprises 15 an organic peroxide curing agent and a curing agent for epoxy resin.
3. A carbon fiber-reinforced resin composite material according to Claim 2, wherein the curing agent for epoxy resin is an imidazole.
- 20 4. A carbon fiber-reinforced resin composite material according to Claim 1, wherein the ethylenically unsaturated group possessed by the epoxy group-containing vinyl ester resin (A) is an acrylic acid residue or a methacrylic acid residue.
- 25 5. A carbon fiber-reinforced resin composite material according to Claim 1, which has a Tg of 150°C or higher.
6. A composition for production of carbon fiber-reinforced

resin composite material, comprising:

(A) an epoxy group-containing vinyl ester resin having, in the molecule, 0.8 to 0.3 equivalent of epoxy group and 0.2 to 0.7 equivalent of an ethylenically unsaturated group,

5 (B) a radical-polymerizable monomer,

(C) a curing agent, and

(D) a carbon fiber impregnated with 0.3 to 5% by mass of (d) a vinyl ester resin as a sizing agent, obtained by an addition reaction of an epoxy resin and an ethylenically 10 unsaturated carboxylic acid.

7. A composition for production of carbon fiber-reinforced resin composite material according to Claim 6, wherein the curing agent (C) comprises an organic peroxide curing agent and a curing agent for epoxy resin.

15 8. A composition for production of carbon fiber-reinforced resin composite material according to Claim 6, wherein the curing agent for epoxy resin is an imidazole.

9. A composition for production of carbon fiber-reinforced resin composite material according to Claim 6, wherein the 20 ethylenically unsaturated group possessed by the epoxy group-containing vinyl ester resin (A) is an acrylic acid residue or a methacrylic acid residue.

10. A composition for production of carbon fiber-reinforced resin composite material according to Claim 6, which 25 comprises:

the epoxy group-containing vinyl ester resin (A) in an amount of 100 parts by mass,

the radical-polymerizable monomer (B) in an amount of 10 to 50 parts by mass,

the organic peroxide contained in the curing agent (C), in an amount of 0.1 to 5 parts by mass relative to 100 parts 5 by mass of the total of the components (A) and (B),

the curing agent for epoxy resin contained in the curing agent (C), in an amount of 0.1 to 5 parts by mass relative to 100 parts by mass of the total of the components (A) and (B),

10 the sizing agent in an amount of 0.3 to 5% by mass based on the carbon fiber (D) impregnated with the sizing agent, and

the carbon fiber (D) in an amount of 50 to 80% by mass based on the total mass of the composition for production of 15 carbon fiber-reinforced resin composite material.

11. A process for producing a carbon fiber-reinforced resin composite material, which comprises kneading a resin mixture of (A) an epoxy group-containing vinyl ester resin having, in the molecule, 0.8 to 0.3 equivalent of epoxy group and 0.2 to 20 0.7 equivalent of an ethylenically unsaturated group, (B) a radical-polymerizable monomer and (C) a curing agent, with (D) a carbon fiber impregnated with 0.3 to 5% by mass of (d) a vinyl ester resin as a sizing agent, obtained by an addition reaction of an epoxy resin and an ethylenically 25 unsaturated carboxylic acid.

12. A process for producing a pultrusion product, which comprises kneading a resin mixture of (A) an epoxy group-

containing vinyl ester resin having, in the molecule, 0.8 to 0.3 equivalent of epoxy group and 0.2 to 0.7 equivalent of an ethylenically unsaturated group, (B) a radical-polymerizable monomer and (C) a curing agent, with (D) a carbon fiber  
5 impregnated with 0.3 to 5% by mass of (d) a vinyl ester resin as a sizing agent, obtained by an addition reaction of an epoxy resin and an ethylenically unsaturated carboxylic acid, to obtain a composition for production of carbon fiber-reinforced resin composite material and then subjecting the  
10 composition for production of carbon fiber-reinforced resin composite material to pultrusion.